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U.S. NATIONAL INSTITUTES OF HEALTH

THE PRINCIPAL RESEARCH BRANCH  
OF THE PUBLIC HEALTH SERVICE

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NATIONAL INSTITUTES OF HEALTH

The National Institutes of Health constitute the principal research branch of the U. S. Public Health Service. They are six in number -- the Experimental Biology and Medicine Institute, the Microbiological Institute, the National Cancer Institute, the National Heart Institute, the National Institute of Dental Research, and the National Institute of Mental Health.

The scope of their program, which is carried forward by a large complement of scientists at the Institutes' research center in Bethesda, Maryland, and at widely scattered field stations and laboratories, is almost as broad as the attack of disease itself on mankind. It extends into practically all fields of medical research and all branches of public health science.

### Intramural Program

Some of the studies undertaken are fundamental; others have immediate and direct application. They may seek the nature and cause of specific diseases or pursue the development of drugs, serums, antibiotics, vaccines, or unknown agents that will aid in prevention, control, or cure. Or they may be concerned with general problems of nutrition, aviation medicine, or some other field. The studies range from a search for the causes of the common cold to the causes of cancer, from investigations of the clinical value of recently developed drugs to studies of new applications of nuclear energy.

The Institutes are frequently presented with perplexing medical and scientific problems from every section of the country and even from foreign lands. For instance, State and local health departments often call upon the Public Health Service for assistance in identifying and controlling contagious diseases and in solving other health problems.

### Grants and Fellowships

The vast intramural research program is supplemented by a program of research grants and fellowships. Through the grants, hundreds of universities, hospitals, laboratories, and individual scientists receive funds to carry on special projects; through the fellowships, promising young scientists are trained for future service. Recommendations for research grants are made by the national advisory councils of the various Institutes, and both programs are administered by a Division of Research Grants and Fellowships. Since the inception of these programs, 4,126 grants totaling \$62,818,569 have been made and 1,146 fellowships awarded.

While most of the fellowships are awarded to medical students or young doctors, a few special fellowships are awarded to scientists who have already demonstrated outstanding ability or who possess specialized training for a specific problem. During the past year, for example, three Nobel Prize winners have been working at the Institutes as special fellows -- Dr. Otto H. Warburg of Germany, Dr. Albert Szent-Gyorgyi of Hungary, and Dr. Bernardo A. Houssay of Argentina.

### Early Days

The many well-equipped and well-staffed laboratories of the National Institutes of Health descend in direct line from a home-made microscope in a single room at the Marine Hospital on Staten Island. It was there in 1887 that Dr. Joseph J. Kinyoun built an apparatus modeled after the one used by Robert Koch, the German scientist, and demonstrated that the organism of cholera was present among passengers and crews of ships arriving in this country from the Old World. Shortly thereafter Dr. Kinyoun was sent abroad to study the new science of bacteriology under Koch in Berlin and at the Pasteur Institute in Paris.

Upon his return Dr. Kinyoun's little laboratory began to attract more and more attention, and before long it was transferred to Washington, named the Hygienic Laboratory, and given the entire top floor of a building on Capitol Hill. It was at this time that Public Health Service officers were first detailed to assist in laboratory work.

In a few years the Laboratory grew out of its Capitol Hill space, and Congress provided funds for a building on a knoll overlooking the Potomac River, not far from where the Lincoln Memorial now stands. The Laboratory remained there for almost 40 years, its one building expanding into four.

### Present Facilities

In 1938 the Laboratory, by then known as the National Institute of Health, was moved to its present site on a 320-acre wooded tract in the Maryland countryside, about 12 miles northwest of Washington, D.C. The 90-acre nucleus of this tract was donated by Mr. and Mrs. Luke I. Wilson.

Emergency construction funds were allotted by the President, and six red-brick Georgian buildings were erected to house administration headquarters, offices, and modern laboratories. Two other permanent structures were subsequently added, one of them the Laboratory of Infectious Diseases, which is an air-sealed, air-conditioned building with special sterile rooms and cabinets with electric incinerators.

Temporary buildings have also been erected to house experimental animals and equipment and to provide space for special studies. One very large temporary structure is used for office space.

### Future Facilities

Research facilities at the National Institutes of Health are to be expanded by a 14-story, 500-bed Clinical Center and associated laboratories where emphasis will be placed upon the degenerative and mental diseases, now the dominant causes of disability and death in this country.

Extensive excavation work for the Clinical Center started during the summer of 1948, and by September 1949 the substructure was nearing completion and the contract for construction of the superstructure had been awarded.

This building, scheduled for completion by July 1952, will combine within a single structure both hospital and laboratory facilities, including the usual features of a 500-bed general hospital together with medical and psychiatric social service, physical and occupational therapy, and rehabilitation services.

Ground was also broken during 1948 for a Radioactive Laboratory, which was practically completed by September 1949.

This building will contain laboratory units designed particularly for work with radioactive substances. Special protective features will include concrete walls two feet thick, lead-shielded hoods over the benches, and provision for the capture and safe disposal of "hot" particles from the air as well as liquid wastes.

### Personnel

At the present time 2,732 people staff the laboratories, field stations, and administrative and maintenance offices of the Institutes; and of this number, 1,732 are located in Bethesda. Included in the overall figure are 239 commissioned officers of the Public Health Service and more than 514 other professional and scientific personnel. Among them are some of the outstanding scientists in their fields.

The Director of the National Institutes of Health is Dr. R. E. Dyer, who has been closely associated with the research work of the Institutes for many years.

### Expansion of Program

The physical expansion of the research facilities and program of the National Institutes of Health down through the years reflects the growing demand of the public for wider participation by government in preventive medicine and medical research. As originally provided by Congress, the purpose of the Hygienic Laboratory was to investigate "infectious and contagious diseases, and matters pertaining to public health." In 1912, research functions were further defined to include "all diseases of mankind and conditions producing diseases." And in 1930 Congress established the National Institute of Health to coordinate research, and again expanded research frontiers and funds.

The first of the separate Institutes was created by Congress in 1937 -- The National Cancer Institute. The National Heart Institute and the National Institute of Dental Research are the result of legislation enacted in 1948 to increase the limited programs underway in both fields. Two other institutes, the Microbiological Institute and the Experimental Biology and Medicine Institute, resulted from an administrative reorganization of long-established laboratories; and, finally, the National Institute of Mental Health, which had been authorized by the 79th Congress, was established in April 1949.

Experimental Biology and Medicine Institute

The field of research of the Experimental Biology and Medicine Institute is that of the basic medical sciences. The objective of its studies is to advance knowledge in the prevention, cause, diagnosis, and treatment of disease in general. With a wide range of fields for study, the work of this institute is directed toward an explanation of some of the more pressing problems of universal interest in the medical world.

Here are a few examples of the projects and accomplishments of this institute during the past year:

A new antibiotic was discovered that may prove more effective than streptomycin in the treatment of tuberculosis.

A new method of estimating histamine was developed that may prove a useful tool in learning the cause and effective treatment of allergies.

Electron-microscope pictures were taken that showed for the first time the internal structure of a molecule. It was also demonstrated by electron microscopy what happens inside the cell of a bacterium when it is attacked by viruses.

A six-year study was completed which showed ultraviolet irradiation had no effect on the incidence of air-borne diseases.

Evaluation was made of the clinical effectiveness of the new analgesic drugs -- metapon, amidone, and demerol.

Microbiological Institute

The Microbiological Institute is conducting fundamental research on the relationship between disease-producing agents and the cells of their host organisms, and on conditions influencing survival of these agents. It is the oldest of the institutes in terms of program. The success of early workers in their efforts to control epidemics and plagues in this country are counted among the more spectacular achievements of the Public Health Service:

Important projects during the past year included:

1. Removal of the paralytic factor from rabies vaccine.
2. Chemical identification of one of the viruses concerned in production of the common cold.
3. The role of milk in the epidemiology of Q fever.
4. Experimental infection of rabbits with Amoeba histolytica.
5. Experimental transmission of human schistosomes by two species of native United States snails.
6. Proof of the importance of flies in the epidemiology of diarrhea and dysentery.
7. The epidemiology of conjunctivitis due to Koch-Weeks bacillus.

National Cancer Institute

The cause and cure of cancer are among the most urgent problems in medical research today. Cancer is the second cause of death in the country. The National Cancer Institute is making a three-pronged attack on this problem through research, control, and research grants.

Projects and accomplishments during the past year:

In testing 900 chemical compounds, 50 were found that produced destructive effects on tumors in mice, thus proving the value of a screening method in developing chemotherapeutic agents against cancer.

Hormone-induced tissue growth in the reproductive system was found to be greatly reduced in animals fed on a diet deficient in folic acid, a vitamin of the B complex. Acting on this observation, researchers used anti-vitamins to block quantitatively the growth stimulating effect of female sex hormones on the uterus.

Some new enzyme systems, discovered by investigators, were shown to be extremely low and others extremely high in tumors as compared with normal tissue.

National Heart Institute

Cardiovascular diseases are the Nation's leading cause of death and one of its major causes of disability. The National Heart Institute was established to conduct a research and training problem on a scale commensurate with the gravity of the problem.

The cardiovascular research program of the National Heart Institute includes investigations in the related field of gerontology. It was concerned during the past year with studies of exercise and work capacity, cardiovascular and metabolism research, kidney function and cardiorenal studies, the investigation of perceptual and learning ability, and also the technical development of scientific instruments (such as the electrokymograph) and methods for the diagnosis of heart diseases.

The program includes cooperative arrangements with outside institutions. It is anticipated that considerable expansion of intramural research will be made possible with the opening of the Clinical Center.

National Institute of Dental Research

The National Institute of Dental Research is seeking new and improved techniques for preventing and treating dental caries, pyorrhea, and other dental illnesses.

During the past year, fundamental scientific studies included the morphology, growth characteristics, and metabolism of oral microorganisms suspected of causing dental diseases; the physical and chemical stability of tooth substances as influenced by fluorides, citrates, and the aging processes; and the fluoridation of the Grand Rapids, Mich., public water supply.

The relative importance of polysaccharides, disaccharides, and monosaccharides in the production of dental caries was investigated.

Studies of spirochetes with the electron microscope indicated that the previously held opinion that they are devoid of flagella is incorrect.

National Institute of Mental Health

A million patients a year are treated in mental institutions in this country; and many more millions — the estimates range from 30 to 50 million — are handicapped by mental and emotional disorders that manifest themselves in physical complaints, anti-social behavior, and other symptoms not usually treated in mental institutions.

To combat this very serious problem, the National Institute of Mental Health fosters research programs, the training of mental health personnel, and the development of services for the prevention and early treatment of mental illness.

When the Clinical Center is completed, this institute will be able to develop a more extensive research program.

Research projects and accomplishments during the past year:

Basic knowledge was disclosed in studies of the brain which paves the way for discovery of the mechanisms and causes of epilepsy and other convulsive disorders.

Similarity between chronic barbiturate and chronic alcoholic intoxication was indicated by studies in a Public Health Service hospital for drug addicts.

### Past Accomplishments

No attempt has ever been made to compile a list of the contributions to medical knowledge made by the scientists of the National Institutes of Health. The story of their work down through the years is scattered through thousands of reports in medical and scientific journals. The following list of research accomplishments indicates just a few of the many:

They developed a vaccine for typhus fever.

They developed an effective vaccine against Rocky Mountain spotted fever -- the first vaccine against any rickettsial disease.

They demonstrated that fluorides in drinking water are related to dental decay.

They did pioneer work on bacterial content of milk and prevention of milk-borne diseases, which resulted in uniform milk codes and regulations.

They developed an anti-malarial drug which, taken as a tablet once a week, promises to become a potent preventive measure.

They developed metapon, a powerful pain-killing drug which can be given by mouth and has few side reactions.

They improved yellow fever vaccine.

National Institutes of Health

They discovered and described hookworm disease in this country for the first time.

They developed a vaccine against typhus fever that was used with success among servicemen during the last war.

They developed a shadowing technique in conjunction with the electron microscope that is now widely used throughout the world. This technique has made possible the visualization of many of the viruses and their study.

The list of research accomplishments could be extended over many pages, and it is never static. New accomplishments are continually being added to it through the patient work of the research scientists of the National Institutes of Health.

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